

Date: November 15, 1999 (Rev. # 0)SOP No. ISSI-VBI70-12Title: SURFACE SOIL SAMPLING AT SCHOOLS AND PARKS**APPROVALS:**Author ISSI Consulting Group, Inc.Date: November 15, 1999

**SYNOPSIS:** A standardized method for collection of surface soil samples at schools, parks, and commercial properties is described. Protocols for sample collection, and sample handling are provided.

Received by QA Unit:

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Revision Date	Reason for Revision

**TECHNICAL STANDARD OPERATING PROCEDURE**  
**SURFACE SOIL SAMPLING AT SCHOOLS AND PARKS**

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## **1.0 PURPOSE**

The purpose of this Standard Operating Procedure (SOP) is to provide a standardized method for collecting surface soil samples to be used by employees of USEPA Region 8 contractors/subcontractors supporting USEPA Region 8 projects and tasks. This SOP describes the equipment and operations used for sampling surface soils in areas which will produce data that can be used to support risk evaluations. Site-specific deviations from the procedures outlined in this document must be approved by the USEPA Region 8 Remedial Project Manager, or Regional Toxicologist prior to initiation of the sampling activity.

## **2.0 RESPONSIBILITIES**

The Field Project Leader (FPL) may be an USEPA employee or contractor who is responsible for overseeing the surface soil sampling activities. The FPL is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the Project Plan. It is the responsibility of the FPL to communicate with the Field Personnel regarding specific collection objectives and anticipated situations that require any deviation from the Project Plan. It is also the responsibility of the FPL to communicate the need for any deviations from the Project Plan with the appropriate USEPA Region 8 personnel (Remedial Project Manager, or Regional Toxicologist).

Field personnel performing surface soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples.

## **3.0 EQUIPMENT**

- Soil augers - Various models of soil augers are acceptable and selection of the specific brand and make of tool will be recommended by the contractor implementing the field work (Morrison Knudsen Corporation). Augers are usually made of stainless steel, and should be capable of retrieving a cylindrical plug of soil 2 inches in diameter and 2 inches deep. In all cases the procedures recommended by the manufacturers should be followed with regard to use of the auger. Augers with disposable plastic sleeves may be employed to minimize the decontamination effort.
- Collection containers - plastic ziplock bags
- Trowels - for extruding the soil sample from the auger. May be plastic or stainless steel.
- Gloves - for personal protection and to prevent cross-contamination of samples. May be plastic or latex. Disposable, powderless.

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- Field clothing and Personal Protective Equipment - as specified in the Health and Safety Plan.
- Field notebook -used to record progress of sampling effort and record any problems and field observations.
- Permanent marking pen - used to label sample containers.
- Three-ring binder book - to store necessary forms used to record and track samples collected at the VBI70 site. Binders will contain Data Collection Sheets, Site Diagrams, and sample labels for each day.
- Measuring tape or pocket ruler -used to measure the length of soil core in the soil coring device.
- Trash Bag - used to dispose gloves and wipes.

#### **4.0 METHOD SUMMARY**

Grab samples will be collected from the 0-2 inch soil horizon and placed into separate plastic ziplock bags. Each sample will be collected using a clean auger and trowel, and identified with a unique number ending with "-R", provided on the sample labels. One label is placed on the Surface Soil Collection Data Sheet for Schools and Parks (example provided in Attachment 1) and the other label is affixed to the zip-lock bag containing the sample. Sample labeling will occur as prescribed below:

- Place a pre-printed label ending with the "-R" onto the zip-lock bag (See Sample Identification and Tracking SOP# ISSI-VBI70-01)
- Place a pre-printed label ending with the "-R" onto the Surface Soil Data Collection Sheet for Schools and Parks
- Place all the ziplock bags for grab samples collected at each location (school or park) into a larger (gallon size or larger) zip-lock bag that has been marked on the outside of the bag with the area identification number (or name of the park or school) with permanent marker.

#### **4.1 Soil Sample Location Identification**

The surficial sampling locations within a park or school will be based on the area of each location, as determined by a sampling grid design. For this portion of the Phase 3 field sampling, maps and site sketches for all of the schools and parks to be sampled have been prepared. The number of grab samples to be collected at each of these locations has been recorded on the site diagram for each location. Copies of these site diagrams are provided in the Sampling and

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Analysis Plan (SAP) for schools and parks. In areas less than or equal to approximately 1,500 square feet, a total of 15 grab samples will be collected. In areas greater than approximately 1,500 square feet, a total of 30 grab samples will be collected. In the event that additional locations are selected for surface soil sampling, the following procedure is provided for determining the number of grab samples that should be collected. Identification of individual grab sample locations will be performed using the following general steps.

The team leader (TL) for each sampling team will be trained in this procedure in order to ensure replicable sample location assignment. The following steps will be followed (in order) prior to any sample collection:

- a. Measure each yard
- b. Pace off each building or permanent obstruction
- c. Identify major samplable areas
- d. Determine the number of sample points in each location
- e. Record sample locations
- f. Mark sample locations
- g. Collect the sample

#### 4.1.1 Measure each location

Site diagrams for schools and parks that will be sampled as part of the Phase 3 field investigation have already been prepared, and are included in the SAP for schools and parks. The following procedure is provided as a description of the methods that were used to prepare these maps.

The TL will visit each sampling location to assign the sampling scheme. The TL will measure the property dimensions with a measuring tape, measuring wheel or laser measuring device ( $\pm 0.5$  feet). Draw a sketch of the property and record property dimensions, north orientation, and adjacent streets and alleyways on the site diagram.

#### 4.1.2 Pace off each building or permanent obstruction

Schools and parks that will be included in the Phase 3 field investigation have already been measured, and the site diagrams are included in the SAP for schools and parks. The following procedure describes the methods that were used to prepare those maps.

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The TL will then pace off the major permanent structures of the residence (e.g., dimensions of the property boundary, house, garage, driveway, etc.) and prepare a site diagram to approximate scale ( $\pm 3$  feet on each measurement). The goal is not have a drawing to scale, but instead to have an estimate of the total samplable area at each location. The total samplable area is defined as any area on the property that is free of permanent obstructions. Temporary obstructions such as automobiles or trailers parked on unpaved property locations, picnic tables, or plastic or other materials covering the property are not permanent structures and will be considered "samplable". Therefore, areas that could be used in the future if the temporary obstructions were removed, should be identified on the field diagram and must be considered in sample location identification. Figure 1 and Figure 2 provide examples of a typical residence at the VBI70 site that has been drawn on a grid.

#### 4.1.3 Determine the number of sample points at each location

For each location, the samplable area will be divided into rectangular subareas, using natural boundaries such as buildings, sandboxes, or sidewalk as division markers (See Figure 2). For convenience, it is recommended that the number of subareas identified is minimized. Draw the subareas on the site diagram sheet. Count the number of squares in each subarea and record this information on the field data sheet. Add the total number of squares contained in each of the subareas, and record in the appropriate space on the surface soil data sheet. Divide this number by the number of grab samples collected at that property, and record in the appropriate space on the data sheet (Attachment 1).

#### 4.1.4 Record sample locations

Before placing marker flags at each location, mark their planned location on the site diagram. Marking flag locations on the site diagram before actually placing them will give the TL a chance to check that sample locations are evenly distributed within each location, and that sample locations are documented and recorded. Because property sizes and obstacles present at each sampling location may vary significantly, actual grab sample locations will be identified using a diagram that will be drawn for each individual property sampled. If either permanent or temporary obstructions are present at the intended sampling locations, the sample point should be offset so that a surficial grab sample may be collected, then the actual sample location must be correctly documented on the field diagram. If the TL identifies an error in the sample location identification procedures that compromise the readability of the document, a new, revised diagram may be necessary. After recording all of the sample points, the TL should check the site diagram to make sure that sample locations are not clustered in any area (unless clustering is a result of offsetting sample locations due to obstructions). The TL should also verify that sample points are approximately equidistant throughout the property.

#### 4.1.5 Mark sample locations

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Starting at one corner of the property, stake sample locations so that there is an even distribution of flags at each location (Figure 2). As seen in Figure 2, the location of each marker flag should be approximately equidistant from the other flags. A sample location or flag may be reassigned if clustering is observed.

## **5.0 COLLECTION OF SOIL SAMPLES USING A SOIL AUGER**

A new pair of plastic gloves are to be worn at each sample point.

Place the soil coring tool on the ground and position it vertically. Holding the tool handle with both hands, apply pressure sufficient to drive the tool approximately 2 inches into the ground while applying a slight twisting force to the coring tool. Remove the tool by pulling up on the handle while simultaneously applying a twisting force. If the sample was retrieved successfully, a plug of soil approximately two inches long should have been removed with the coring tool.

Hold the soil coring tool horizontally or place it on the ground. Using a clean spatula or knife, remove the soil collected at depth greater than two inches from the end of the sampling tool. Allow this soil to fall into the plastic bucket designated for excess soil material. Use a trowel to extrude the soil from the auger, pushing the two-inch soil plug from the coring tool so that it falls directly into the zip-lock bag.

Care should be taken to avoid tracking soil from one area to another. As samples are taken sequentially, care should also be taken not to contaminate an area yet to be sampled with the residue of the sample that is currently being taken. In general one should move in a single direction through the sampling area. If an area is known or suspected of having a higher concentration of metals, all other considerations being equal, it should be sampled last to prevent cross contamination.

Decontaminate equipment as described in Section 9.0.

## **6.0 SAMPLE CONTAINERS AND LABELING**

Following the procedures outlined in Section 5.0, grab samples will be collected directly into zip lock bags and labeled in accord with the most recent version of the Sample Identification and Tracking SOP (# ISSI-VBI70-01). Each sample must have a sample identification number affixed to the zip-lock bag, and also attached to the Surface Soil Data Sheet for Schools and Parks.

## **7.0 SITE CLEAN-UP**

Each hole must be backfilled with clean topsoil and tamped down lightly. If sod was removed to

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obtain the soil sample, the hole should first be backfilled and then the grass plug be replaced by the field personnel.

Rinse water used for sample decontamination that is generated in the course of sample collection must be disposed of as specified in the SOP for Investigation Derived Waste Management (MK-VBI70-04). Wherever possible, sod and soil (not collected and retained as part of the grab sample) should be replaced in the same hole.

Throw all used wipes and gloves into the trash bags and take with you to dispose of at the field office.

## 8.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Adherence to quality assurance/quality control (QA/QC) procedures is an important part of field sample collection. Field QA/QC procedures include documentation requirements and preparation of field QC samples.

### 8.1 Field Quality Control Samples

The following QC sample will be collected during surface soil sampling.

**Field Duplicate:** Field duplicate samples are co-located samples at a single grab sample location. These samples are submitted blind to the laboratory to test both the precision of the laboratory analysis and the precision of sample collection. Field duplicates are required to be collected at a frequency of 5% of all surface soil grab samples collected (1 field duplicate per 20 investigation samples collected).

### 8.2 Field documentation

A field notebook should be maintained by each individual or team that is collecting samples as described in the Project Plan. For each location (school or park), the following information should be collected.

- h. date
- i. time
- j. personnel
- k. weather conditions
- l. a sketch of the sample location that is filled in with sample identification numbers as the samples are collected
- m. locations of any samples that could not be acquired
- n. descriptions of any deviations to the Project Plan and the reason for the deviation

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Samples taken from soils with visible staining or other indications of non-homogeneous conditions should be noted. Use the maps provided by the FPL or draw a diagram that details each sample area (school or park). Sample locations and sample numbers should be identified on the diagram.

In addition, each field crew will maintain a three-ring binder book that has Surface Soil Data Sheets and sample labels needed for each day. At the end of the day, the field crew will submit these forms and check them in with the FPL at the time that the samples are checked in.

Field personnel will collect the proper type and quantity of quality control samples as prescribed in the Project Plan.

#### 9.0 DECONTAMINATION

Because decontamination procedures are time consuming, having a quantity of sampling tools sufficient to require decontamination at a maximum of once per day is recommended. All sampling equipment must be decontaminated prior to reuse. Follow the procedures outlined in SOP No. MK-VBI70-07.

#### 10.0 GLOSSARY

Project Plan - The written document that spells out the detailed site-specific procedures to be followed by the Project Leader and the Field Personnel.

Sample Point - The actual location at which the sample is taken. The dimensions of a sample Point are 2" in diameter and 2" deep.

#### 11.0 REFERENCES

USEPA, 1995. Residential Sampling for Lead: Protocols for Dust and Soil Sampling, Final Report, EPA 747-R-95-001, USEPA, March 1995, 38 p.

American Society for Testing and Materials, 1995. Standard Practice for Field Collection of Soil Samples for Lead Determination by Atomic Spectrometry Techniques, ASTM Designation: E 1727 - 95, October 1995, 3 p.



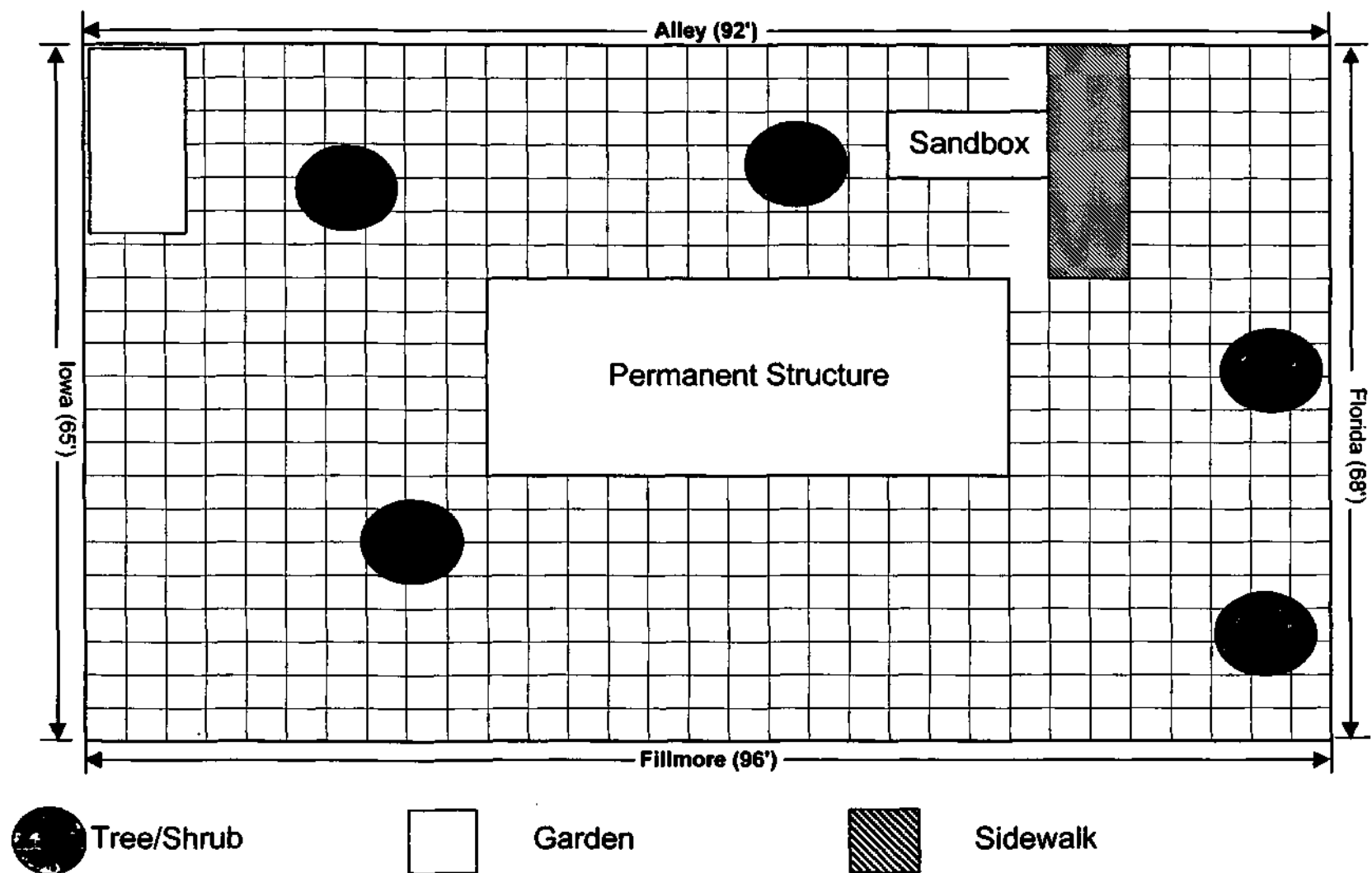
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**ATTACHMENT 1**

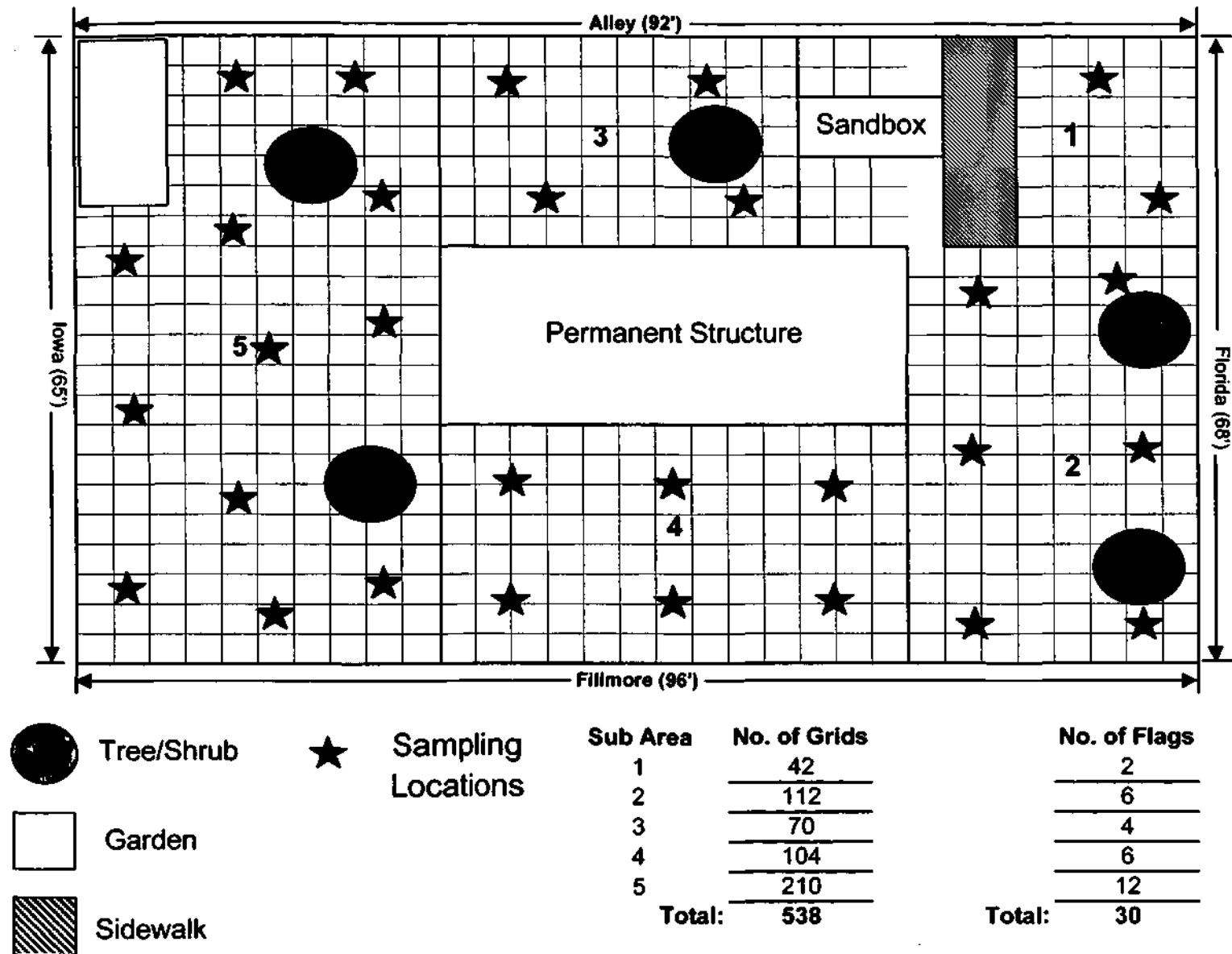
**Figure 1 Proposed Grid Sampling Design for Surface Soil Collection at Schools and Parks**

**Step 1:**



**Figure 2 Proposed Grid Sampling Design for Surface Soil Collection at Schools and Parks**

**Step 2:**



Divide by no. of  
Grab Samples  
(30):

17.9

No. of grab  
samples:

30

## SURFACE SOIL COLLECTION DATA SHEET FOR SCHOOLS AND PARKS

PHASE: 3MEDIUM: School or Park Soil

DATE: \_\_\_\_\_

DEPTH: 0-2"

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 SAMPLE  
COLLECTION  
METHOD: SOP-ISSI-VB170-12

LOCATION NAME: \_\_\_\_\_

LOCATION ADDRESS: \_\_\_\_\_

SAMPLE TEAM ID: \_\_\_\_\_

INDEX	SAMPLE NO.	CLASS FS = Field Sample FD = Field Duplicate	SAMPLE TYPE	ORIGINAL SAMPLE NO.
1		FS FD	GRAB	
2		FS FD	GRAB	
3		FS FD	GRAB	
4		FS FD	GRAB	
5		FS FD	GRAB	
6		FS FD	GRAB	
7		FS FD	GRAB	

Name of School or Park: \_\_\_\_\_

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INDEX	SAMPLE NO.	CLASS FS = Field Sample FD = Field Duplicate	SAMPLE TYPE	ORIGINAL SAMPLE NO.
8		FS FD	GRAB	
9		FS FD	GRAB	
10		FS FD	GRAB	
11		FS FD	GRAB	
12		FS FD	GRAB	
13		FS FD	GRAB	
14		FS FD	GRAB	
15		FS FD	GRAB	

Name of School or Park : \_\_\_\_\_

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INDEX	SAMPLE NO.	CLASS FS = Field Sample FD = Field Duplicate	SAMPLE TYPE	ORIGINAL SAMPLE NO.
16		FS FD	GRAB	
17		FS FD	GRAB	
18		FS FD	GRAB	
19		FS FD	GRAB	
20		FS FD	GRAB	
21		FS FD	GRAB	
22		FS FD	GRAB	
23		FS FD	GRAB	

Name of School or park: \_\_\_\_\_

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INDEX	SAMPLE NO.	CLASS FS = Field Sample FD = Field Duplicate	SAMPLE TYPE	ORIGINAL SAMPLE NO.
24		FS FD	GRAB	
25		FS FD	GRAB	
26		FS FD	GRAB	
27		FS FD	GRAB	
28		FS FD	GRAB	
29		FS FD	GRAB	
30		FS FD	GRAB	

Name of School or Park: \_\_\_\_\_

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INDEX	SAMPLE NO.	CLASS FS = Field Sample FD = Field Duplicate	SAMPLE TYPE	ORIGINAL SAMPLE NO.
31		FS FD	GRAB	
32		FS FD	GRAB	
33		FS FD	GRAB	

Samples Collected by:

\_\_\_\_\_  
Signature\_\_\_\_\_  
Date

Logbook Page Reviewed by:

\_\_\_\_\_  
Signature\_\_\_\_\_  
Date